

Capacitors and Capacitance Assignment 1

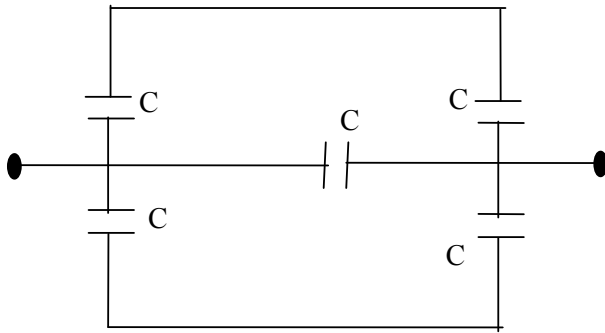
Question 1

Capacitance of a parallel plate air capacitor depends on

- (a) Thickness of conducting plates
- (b) Charge on the conducting plates
- (c) Area of the conducting plates
- (d) Distance of separation between the conducting plates

Question 2

Equivalent capacitance of system of capacitors shown below in the figure is



- (a) $C/2$
- (b) $2C$
- (c) C
- (d) None of these

Question 3

A parallel plate air capacitor with no dielectric between the plates is connected to the constant voltage source. How would capacitance and charge change if dielectric of dielectric constant $K=2$ is inserted between the plates. C_0 and Q_0 are the capacitance and charge of the capacitor before the introduction of the dielectric.

- (a) $C=C_0/2$; $Q=2Q_0$
- (b) $C=2C_0$; $Q=Q_0/2$
- (c) $C=C_0/2$; $Q=Q_0/2$
- (d) $C=2C_0$; $Q=2Q_0$

Question 4

A parallel plate capacitor of capacitance C is connected to a battery and is charged to a potential difference V . Another capacitor of capacitance $2C$ is similarly charged to a potential difference $2V$. The charging battery is then disconnected and the capacitors are connected in parallel to each other in such a way that the positive terminal of one is connected to the negative terminal of the other. The final energy of the configuration is

- (a) Zero
- (b) $3CV^2/2$
- (c) $25CV^2/6$
- (d) $9CV^2/2$

Question 5

A parallel plate air capacitor is connected to a battery. The quantities charge, voltage, electric field, and energy associated with this capacitor are given by Q_0 , V_0 , E_0 and U_0 respectively. A dielectric slab is now introduced to fill the space between the plates with battery still in connection. The corresponding quantities are now given by Q , V , E and U are related to previous quantities as

- (a) $Q > Q_0$
- (b) $V > V_0$
- (c) $E > E_0$
- (d) $U > U_0$

Question 6

The effective capacitance of a capacitor is reduced when capacitors are connected in

- (a) series
- (b) parallel
- (c) series-parallel combination
- (d) none of the above

Question 7

Two identical conducting plates of plate area A are separated by a distance d to form a parallel plate air capacitor. Now a metal sheet of thickness $d/2$ is inserted between the plates of the capacitor. The ratio of capacitance before the insertion of plate and after the insertion of plate is

- (a) 1:2
- (b) 1:1
- (c) 1:2
- (d) $\sqrt{2}:1$

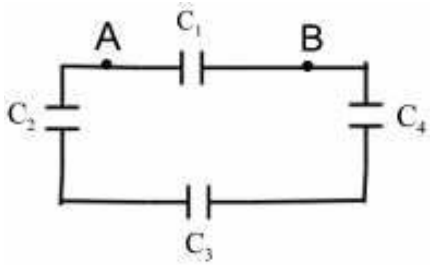
Question 8

The plates of a parallel plate air capacitor are charged to 100 V. A 2mm plate is inserted between the plates of the capacitor. To maintain the same potential difference, the distance between the capacitor plates is increased by 1.6mm. The dielectric constant of the plate is

- (a) 1.25
- (b) 5
- (c) 2.5
- (d) 4

Question 9

Four capacitors are connected as shown below in the figure



Here $C_1=2\mu\text{F}$, $C_2=3\mu\text{F}$, $C_3=4\mu\text{F}$ and $C_4=5\mu\text{F}$. The equivalent capacitance between A and B is

- (a) $1.245 \mu\text{F}$
- (b) $4.446 \mu\text{F}$
- (c) $9 \mu\text{F}$
- (d) $3.27 \mu\text{F}$

Question 10

Consider the figure and value of capacitances given in the Question 9 if a 4Volt battery is connected between points A and B total charge stored on the capacitors would be

- (a) $13.8\mu\text{C}$
- (b) $10 \mu\text{C}$
- (c) $22 \mu\text{C}$
- (d) $4 \mu\text{C}$

Answers:

- 1. (a), (c) and (d)
- 2. (b)
- 3. (d)
- 4. (b)
- 5. (a) and (d)
- 6. (a)
- 7. (a)
- 8. (b)
- 9. (d)
- 10. (a)